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Challenges for Sustainable Rural Development in Ethiopia

Contents

Summary

Rural Ethiopia contains about 85 % of the country's population, nearly all of whom are small-scale peasants living on small agricultural farms in the highland parts of the country. With population increase, particularly in the past century, the rural population has grown from approximately 12 million people around 1900 to about 64 million in 2007. Farm sizes, however, are less than one hectare per household on average; the livestock population, while considerable, is insufficient to provide a labour force to plough the land. Farm productivity is at a minimum, and land degradation due to agricultural practices is widespread.

A major factor of strength, and perhaps a weakness at the same time, is the strong sense of identity in rural Ethiopia. Traditions, norms and values are strongly ingrained and portrayed, the sense of meaning appears clear even if only indirectly articulated, religions are powerful and proud, daily farming activities settled and based on long experience, ethnic and religious conviviality largely well developed and practiced, and the common language well preserved and distinct. This strength of identity, however, is also a weakness in terms of future development. The younger generation manifests a different interpretation of identity than their ancestors. This is probably influenced by modern impacts from outside, through radio, education, the Internet and personal contacts, as well as through critical observation of the present state of peasant households. Most critical, however, is that these elements of rural identity have been, and are still being, carried into politics and policies concerned with development, by people who grew up in rural areas and maintain their previous identities, even though current circumstances may require differential approaches.

Modern development in rural Ethiopia follows practices brought to Ethiopia mainly from outside, but which are adapted to local conditions and underlain by the values and norms of traditional rural Ethiopia. As a consequence, the emphasis in development is on infrastructure, such as road and air access, education, health services, and the maintenance of natural resources. Although agriculture, the primary sector of occupation in a subsistence-oriented community, has the potential to increase productivity considerably, this cannot take place within the present context of rural household economies.

Modern development alone, however, will not suffice to bring about sustainable development, which in rural Ethiopia can be enhanced if a paradigm shift takes place from current 'agricultural development-led industrialisation' (ADLI) to a proposed 'industrialisation-based agricultural transformation' (IBAT). The agricultural work-force needs to be diversified, from primary sector occupation to secondary and tertiary sector employment. Rural areas need fundamental reforms in land use practices, technologies and organisation of labour and rural space. Sustainable use of natural resources needs to become the basis of all agricultural activity in rural areas, to prevent even greater loss of current potential.

The challenges for developing rural Ethiopia lie in an overall increase in productivity in all sectors in rural areas, i.e. in the agricultural, secondary, and tertiary sectors. Sustainable land management, including soil, water and biodiversity conservation, must become the basis of

agricultural activity on all land. Policies addressing rural-urban linkages, land tenure issues, and questions of demographic transition, as well as issues of education and health, can be particularly supportive in accelerating this change. A sectoral transition from the dominance of the primary sector to more emphasis on the secondary and tertiary sectors would have the potential to accelerate change, although perhaps at the risk of social and public security, for which particular care must be taken. Demographic transition, furthermore, probably reached a peak several years ago, but may require attention until a more or less stable population number is reached in the longer-term future. New identities may be formed during this transition, moving from association with traditional rural Ethiopia to association with a modern, interlinked rural-urban landscape.

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1 The Importance of rural Ethiopia

Methodologically, this paper provides a synthetic overview that draws on the author's observations and field experiences, particularly in rural Ethiopia[1] over the past 30 years. It includes his research in the form of rural case studies in many locations in the Ethiopian and Eritrean highlands, and data and results from experimental watersheds that he monitored and studied over a period of nearly 35 years. The results and observations are used to reflect, from a theoretical perspective, on the importance of rural Ethiopia in terms of its share of the population, occupation, identity, modern development and sustainability. Appraisals are made of the potentials for sustainable agriculture and energy production, weaknesses in terms of rural employment as opposed to rural occupation, insufficient infrastructure, inadequate educational services, and a dwindling natural resource base.

By 1 July 2007 about 83.5% of the Ethiopian population, or about 64 million persons, will live in a rural environment (CSA 2006). 'Urban' is usually defined as the opposite of 'rural' and what is not 'urban' is classified as 'rural'. For example, in Ethiopia a town with 2000 inhabitants or more is considered 'urban' (Tegegn-Nuresu Wako 2005). Hence all settlements with less than 2000 inhabitants are considered rural, which makes sense when looking at the infrastructure, administration, employment and markets in such settlements.

More than 90% of the rural population are small-scale subsistence farmers, who mostly live in the highland parts of Ethiopia and engage in a mixture of crop cultivation using ox-plough systems, and hence also have livestock (Figure 1). In the lowlands, there are nomads who focus on livestock, but these are much fewer in number, i.e. less than 10% of the rural segment. While the overall population of Ethiopia has grown from about 12 million in 1900 to about 26 million inhabitants in 1970 and over 77 million today (2007), the rural portion of the population decreased from about 98% in 1900 to about 90% in 1970 and about 83% today, although it has grown from about 2.3 million households in 1900 to about 4.7 million in 1970 and about 11 million households today, assuming a constant average of about 5-6 persons in a household. Rural – urban migration was largely discouraged by the governments of the past 30 years, although migration took place to a moderate extent from rural areas to small towns due to school enrolment of children from rural areas, and from small to medium and larger towns due to movement by young adult generations in particular.

Today over 80% of Ethiopian peasant households cultivate less than 2 hectares of land and have access to perhaps 2-3 hectares of grazing land. Less than 50% of all households own oxen, and even fewer have two oxen, which are needed to equip a plough. Most households have chickens, and many also have sheep and/or goats; fewer have a donkey, a horse or a mule, and most have to borrow one or two oxen to plough their cropland, for which they must

[1] Please note that, with the exception of the term 'Ethiopia', all other local names in this paper have been spelled using the Amharic to English transliteration system of the Ethiopian Mapping Agency. The term Ethiopia itself would be correctly spelled as 'Ityopya'.

always provide compensation. The average harvest per household per year is roughly one tonne of cereals and pulses, plus some livestock products used for festivities or for cash income. The density of the agricultural population is about 120 persons per km^2 in the highlands today.

Figure 1: Traditional ox-plough system for small-scale farming in rural Ethiopia; here in the Anjeni area in Gojam province. Note the steepness of the cropland. Photo by Martin Moll, 1989.

About 50% of the Ethiopian population is in the age of labour-force, i.e. between 15 and 60 years old; 43% are children under 15 years of age (CSA 2006), and about 7% no longer work due to age or are disabled. A breakdown by sector shows that 85% are in the primary sector, about 5% in the secondary, and about 10% in the tertiary sector. This means that in rural areas today there is virtually no secondary or tertiary sector.

In terms of occupation, however, rural Ethiopia is extremely important. Farming absorbs the large majority of the Ethiopian population; the agricultural sector basically feeds itself and satisfies the most essential basic needs, while receiving relatively few governmental and administrative support services. Rural development in all places outside small and larger towns began first on a very small scale, about 1975, when peasant associations were formed, rural development introduced, soil and water conservation initiated, famine relief organised, reforestation carried out, and clinics, water supply systems, rural access roads and schools constructed. This happened first in only few places, but since about 1990, it has become more widespread and intensively implemented throughout the country. Development cooperation was mostly active in support of governments in these fields.

Figure 2: Rural first grade school in a remote area of the Simen Mountains in North Gonder Zone. The shelter was constructed as a necessary condition before a teacher could be assigned. School attendance by children of different ages has been very limited here so far. Photo by Eva Ludi, 1994.

Figure 3: Extreme soil degradation on cropland in the highlands near the town of Tarmaber in North Shewa. Note that the barley crop is growing only on top of the field boundaries and some traditional bunds, while the areas in-between have lost their productive capacity. Agriculture has been practiced here since the area was deforested about 700 years ago; hence the high degree of soil degradation (cf. Hurni 1987). Photo by Hans Hurni, 1982.

Despite these activities, infrastructure, education and employment are still far behind the towns, even more so when the portion of rural people in the country is considered. While enrolment in primary schools in towns today is almost 100 %, this is much less the case in rural areas, depending on the remoteness of the villages (Figure 2). On average, only 60% of Ethiopian children attend school, while in 1970 this figure was only 15%. In the rural setting, again, there is one medical doctor per 150,000 inhabitants, while in towns the ratio is much higher.

The rural landscape in the Ethiopian Highlands, on the other hand, has suffered from extreme deforestation and a high degree of soil degradation due to agricultural practices that do not take soil care measures sufficiently into account (Figure 3). As a consequence rural productivity declined whenever a slope was cultivated over extended periods of time. Severe and widespread soil degradation can thus be observed in those areas where agriculture has a long history, i.e. around Aksum, Lalibela, Gonder, Menz, and Harer, where farmers have practiced crop cultivation for many centuries and even millennia. For example, when James Bruce travelled through northern Ethiopia in the 1770s, he found an agricultural system similar to that of today (Bruce 1790). In areas where agricultural history is younger, i.e. in the southern and western highland parts of Ethiopia, soil degradation damage is less pronounced. Current rates of soil erosion are even higher than those in the ancient agricultural areas, however, because rainfall amount and erosivity in south-western Ethiopia are much higher than in the North.

In a long-term monitoring study carried out by the University of Bern and the Ethiopian Ministry of Agriculture from 1981 to 1998, soil erosion, soil degradation and soil conservation implementation were assessed in field catchments under on-farm conditions in the provinces of Wello, Shewa, Gojam, Harerge, Illubabor, Sidamo and Eritrea (SCRP 2000). Each catchment is between 70 and 700 hectares in size and used for agriculture (cf. Figures 5 and 7). Soil erosion and runoff were measured on test plots ranging from 3 m^2 to 30 m^2 surface area; soil conservation experiments were carried out on plots of 180 m^2 and in the whole catchments, and runoff and sediment loss were monitored at the outlet of the catchments during each storm and throughout all years, before and after conservation. These long-term and persistent activities established one of the most detailed data bases on land degradation and sustainable land management under typical agro-ecological conditions in the Ethiopian Highlands, including associated studies of soils, land use, agricultural production, social organisation and demography of the land users in these areas.

Table 1

Main characteristics of the research sites of the Soil Conservation Research Programme, plus annual rainfall and average catchment runoff for the period from about 1981 to about 1996.
Source: Hurni et al., 2005, based on SCRP data.

SCRP research unit	Catchment area (ha)	Population density (per km²)	Woodland (%)	Grassland (%)	Cultivated land (%)	Annual rainfall (mm)	Catchment runoff (in % of rainfall)
Andit Tid (Shewa)	477	45	15	70	15	1417	55
Anjeni (Gojam)	110	80	5	15	80	1690	43
Maybar (Wello)	113	80	20	20	60	1211	27
Gununo (Sidamo)	94 and 73	180	10	50	40	1340	19 and 11
Hunde Lafto (Harerge)	236	70	15	25	60	860	9
Afdeyu (Eritrea)	177	80	1	29	70	382	6
Dizi (Illubabor)	673	45	65	10	25	1536	5

The main result of the study was that traditional Ethiopian agricultural practices cause excess surface runoff and subsequent soil erosion damage, under different land use types, that are clearly beyond tolerable limits. In relation to runoff from the catchments, however, the long-term runoff averages in Table 1 show big differences. In three out of the seven catchments the overall annual runoff was below 10% of the rainfall, for different reasons in each case. Afdeyu in Eritrea is a semi-arid but intensively cultivated and terraced catchment which retains most rainfall. Hunde Lafto in Harerge is sub-humid and has 40% grassland and woodland. Dizi in Illubabor is a humid catchment with only 10% cultivation and 65% forest land. Two out of the seven catchments have runoff rates between 20 and 40% of the annual rainfall, and the last two are above 40%. These latter two are high rainfall areas; a large portion of their land is either grassland (Andit Tid in Shewa) or cultivated land (Anjeni in Gojam), and only little is forest land.

Figure 4 shows the consequences of land use change and soil degradation on surface runoff. Converting a forest test plot into a grassland test plot would mean that the immediate surface runoff increases by a factor 4, from about 2% to about 8%; this latter figure is again almost doubled to 14% on average if the test plot is transformed into cropland, although there is great variability of long-term average runoff ratios between different cropland plots. When a test plot is severely degraded, the runoff ratio is again more than double compared to cropland, and amounts to 32% of the rainfall on average.

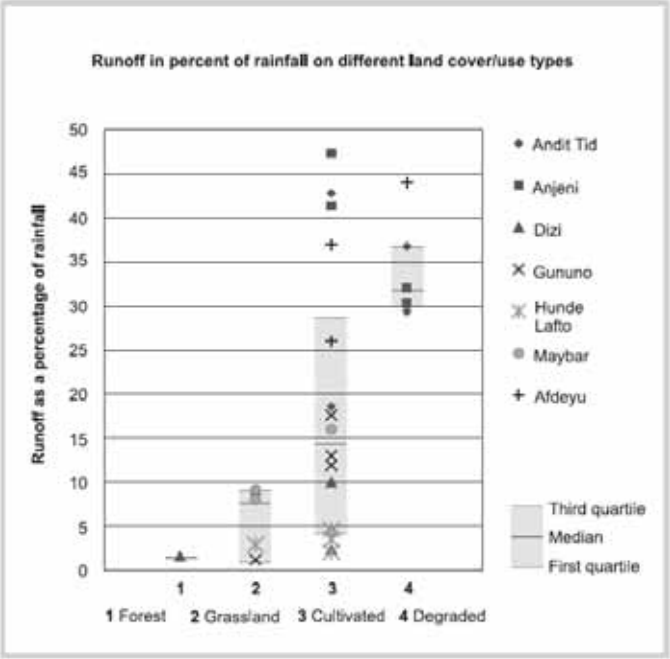

Figure 4: Long-term surface runoff coefficients measured from test plot experiments (2m x 15m) under natural rainfall and field conditions in 7 research sites in the Ethiopian and Eritrean Highlands, 1981 to 1996. Source: Hurni et al. 2005, based on SCRP data.

The above results are of great relevance to Ethiopia; they show that with accelerating land use change and soil degradation less and less water is available for agricultural activities, particularly for crop cultivation, but also for grazing and drinking purposes. This result, on the other hand, may please Sudan and Egypt, as they potentially receive more water due to land use pressure and population increase in the Ethiopian Highlands.

Another result of great relevance is presented here in an old table prepared for an FAO study in 1985 after just a few years of research, and published by Hurni (1987), from where it made its way into most related literature on land degradation in Ethiopia. The table is reproduced here again (Tab. 2), although there are current attempts to refine the results based on ten more years of data compilation and analysis by the Soil Conservation Research Programme (SCRP 2000), also using digital elevation modelling and remote sensing information that was not available at that time.

Soil regeneration, i.e. the formation of soil from the weathered bedrock and blown-in material, was assessed to be about 10 times slower than the removal of topsoil due to water erosion. Reducing overland flow and soil erosion by water has become a major challenge for agriculture in Ethiopia, and is still insufficiently addressed.

Table 2
Estimated average rates of soil loss from slopes in Ethiopia (and Eritrea) dependent on land cover. Source: Hurni 1987, based on SCRP data.

Land cover type (from LUPRD)	Area (%)	Estimated soil loss from slopes	
		t/ha/year	t/year
Cropland (cereals, pulses, tubers)	13.1	42	672,000,000
Perennial crops (inset, coffee, etc.)	1.7	8	17,000,000
Grazing and browsing land	51.0	5	312,000,000
Totally degraded land (badlands)	3.8	70	325,000,000
Currently uncultivable (steep lands)	18.7	5	114,000,000
Forests (natural and afforested)	3.6	1	4,000,000
Wood and bush land (mostly grazed)	8.1	5	49,000,000
Total country	**100.0**	**12**	**1,493,000,000**

In sum, rural Ethiopia is important for its large share of the country's population, which is occupied primordially in small-scale farming, and for its large water potential for rainfed agriculture, irrigation and hydropower generation. Employment, on the other hand, is not widespread, and rural areas suffer from a general lack of infrastructure and hence insufficient social services such as education and health, but also markets. Natural resources, finally, have declined at all levels, from vegetation and related wildlife to agricultural soils and water availability, particularly in the form of surface and soil water (Gete Zeleke and Hurni 2001).

2 Identity, modernity and sustainable rural development

Identity appears to be a strong concept in any rural society, particularly in Ethiopia. From the perspective of cultural institutionalism, identity has been defined by Geertz (1984, cited in Ratner 2004) as '…the shared sense of meaning, norms, traditions, and values that give life richness beyond fulfilling material needs alone.' Because the norms and values forming the identity of different groups are necessarily distinct, this perspective prioritizes the recognition of diversity, which counters the universalizing tendencies often implicit in the rational choice approach.

This definition thus focuses on 'pride of place', since different identity groups, e.g. in a rural setting, usually live in defined spatial units, be it a hamlet, a village, or a district. Following this definition of the term "identity," rural Ethiopia would have a very strong identity. Traditions, norms and values are deeply ingrained and portrayed, and senses of meaning appear clearly even if they are only indirectly articulated; they are distinctly developed and often expressed by the members of a group of rural inhabitants. Religions are powerful and proud, daily farming activities well experienced and settled, ethnic and religious conviviality mostly well developed and practiced, and common languages well preserved and marked. This strength of identity, however, is also a weakness in terms of future development, as it hardly allows room for innovation and change.

According to Barrett (2005), 'Social identity is multidimensional: an individual can belong to multiple communities, groups and networks. Interlocking networks and groups may reinforce the alienation of some subpopulations and contribute to the persistent poverty of certain social groups; or they may bridge divides. The multidimensional nature of identity is central to understanding social and economic polarization – who feels affinity for whom and who is alienated from whom – as well as the intensity of these positive and negative relations between individuals'.

The younger generation in Ethiopia is showing that its own interpretation of identity has started to differ from that of its ancestors. This is probably influenced by modern impacts from outside, through radio, education, the Internet and personal contacts, as well as through critical observation of the present state of peasant households. Very often the peasant sector is called 'backward'; rural life is – rightly – seen as a life of hardship, and peasant families themselves try to ensure that some of their children will enter sectors other than agriculture. They do this by supporting their attendance at school, and by letting them move in with relatives in small towns, if this is an option for the family.

Most critical, however, is that elements of rural identity have been, and are still being, integrated into politics and policies concerned with development. This is done by people who grew up in rural areas and maintain their old identities, even if current circumstances require differential approaches. This is the case for a majority of the current political decision-makers at all levels of government.

Modern development is defined here as development that introduces and exchanges elements from and with other cultures and economies and uses them in one's own cultural setting. These elements may be material goods, information, institutional organisation or the adoption of norms and values. In many countries these processes can be rapid; in the past 30 years in particular, they have accelerated greatly and are now referred to as 'globalisation', particularly when they relate to trade, information, and cultural products and values.

Modern development in rural Ethiopia follows practices brought to Ethiopia mainly from outside, but which are adapted to local conditions and underlain by the values and norms of traditional rural Ethiopia. This process may have begun around the 17th Century, with the construction of bridges and castles in the Gonder region. Later on, in the 19th Century, firearms were purchased and partly self-manufactured, starting with the canons of Emperor Tewodros and the firearms of Emperor Minilik. Later on came the railway from Djibouti to Addis Abeba under Emperor Minilik, and another railway line from Mitsiwa'e to Asmera when Eritrea was an Italian colony. Finally, cars and airplanes were purchased in the early 20th Century by Emperor Haile Selasse. These material goods were introduced into Ethiopia, and are still largely imported and have not been replaced with goods produced by the Ethiopian economy. The emphasis of modern development has thus been on infrastructure, such as road and air access, as well as on education and health services, and has also included the maintenance of natural resources, through influences from environmental movements in the North. In exchange for imported goods, coffee and skins have long been, and still are, important in rural areas of Ethiopia as products produced for the market. As far back as 500-1000 years ago, coffee began to spread from the western Ethiopian Highlands to the Arabian Peninsula and further throughout the world.

Although agriculture, the primary sector of occupation in a subsistence-oriented community, has the potential for considerably increased productivity, this cannot take place within the present setting of rural household economies. Institutionally, Ethiopia has profited from organisational structures developed in Europe and North America, such as postal services, railway services, government administration, educational systems, water supply systems, as well as road and airport networks and the services needed to implement and maintain them. These latter elements of modern development, however, did not penetrate far into rural areas of Ethiopia, although they were instrumental in the development of towns, which started to develop throughout the country whenever these services reached them.

About 80 % of the Ethiopian population of today can be considered as excluded from modern development to a large extent. Why is this so? According to the IAASTD Glossary (forthcoming), 'development is a normative concept that entails complex changes and transformations over time, and the two major elements of development are growth and diversification'. At first sight, rural Ethiopia is highly diversified in terms of household farming systems (Westphal 1975), which are adapted to the general agro-ecological zone (Hurni 1998) and further to the edaphic conditions of a location. If diversification, however, is meant to denote the economic splitting up of a society's labour force into many different

professions, with increasing productivity in terms of inputs of materials, labour and time, then rural Ethiopian society is far from development, not to speak of 'modern' development.

If modernity is taken to be the result of modern development, a few sentences must be added on the status of modernity in traditional rural society in Ethiopia. An analysis based on Giddens and related to the modernity of wealthy nations is useful here. According to Kaye (1994), '…the growth of capitalism and of the nation-state has radically changed the way we experience life. With their encouragement of industrialization and the growth of military power, impersonal markets, social supervision, and organizational power, social relations have been 'globalised' and traditional orders of practice and meaning shattered. Ties to nature, locality, and kin weaken and are increasingly replaced or penetrated by distant social influences operating through 'abstract systems' of thought and organized expertise. Such 'time-space distanciation' and 'disembedding' does more than simply increase the pace and scope of change; it proves profoundly disorienting as well. Life ruled by knowledge and information rather than tradition becomes 'reflexive', always subject to uncertainty, revision, and subversion in the light of new conceptualizations, thereby destroying the positivist dream of anticipating and controlling our fate.'

According to the above quotation, there is little in rural Ethiopian society that could be termed a 'radically changed' way of how life is experienced. However, strong influences can be observed in rural organisation, which come from outside - for example, land tenure legislation, or the Kebele Associations as an institutional organisation introduced by government. Another change that has taken place in the past 30 years is the reaction of rural populations to emerging famine situations, which are less and less interpreted as a fate imposed by God (Mesfin Wolde-Mariam 1991), and more as a feature of climate, the effects of which can be mitigated if government agencies are alerted in time. Markets, social supervision and organisational power, however, are very weak in rural Ethiopia, while traditional practice and meaning persist strongly. Ties to nature, locality and kin are very strong as well; so are the general orientation of power and the role of tradition in a rural Ethiopian setting. Finally, the dream of controlling one's own fate has remained a strong positivist feature.

The younger generation, again, is attracted by modern development and is closer to modernity as well. Primary and sometimes secondary education is much more widespread today than it was 30 years ago, and the younger generation is no longer willing to return to a farm whose plots have been reduced, soils rendered unproductive, and whose subsistence agriculture has become harder to practice.

Modern development, however, should not be taken as a synonym for sustainable development, which is something fundamentally different. Sustainable development by definition is development that meets the needs of the present without compromising the ability of future generations to meet their own needs (Brundtland, 1987). This definition contains a notion of equitable balance between today's and tomorrow's generations, but also within the current generation. Of course both are very idealistic goals, but sustainable development is a useful concept to analyse current disparities as well as processes that may

have negative effects in the future. Most commonly, three dimensions of sustainable development have been distinguished in practice: the ecological, social and economic dimensions. Two more could be added, namely the institutional and political dimensions that help differentiate the social dimension further.

Sustainable rural development in the Ethiopian context may well have been fulfilled for many centuries. There may have been an intra-generational equity that fulfilled the basic needs of a generation to a large extent, with future generations also being able to live on the same resources – natural and otherwise – with the same technologies used by the present generation. Compared to some other ancient civilisations like the Roman Empire, Ethiopian societies may have been following a much more sustainable pathway. Even compared to the industrialised societies of the present day, Ethiopian society may have fewer sustainability problems. The Ethiopian peasantry was obviously able to survive for many thousands of years, and was always dependent on its endowment of natural resources. From the literature we can conclude that Butzer (1981) would disagree with this statement. In the early 1970s he used a geo-archaeological approach in the Aksum area to put forward the hypothesis that the Aksumite Kingdom declined in the first millennium AD due to environmental degradation of its agricultural resource base. And there may be truth in his statement as well. Is our assessment thus contradictory?

In terms of the ecological dimension, the way Ethiopian peasants used natural resources was clearly efficient; namely to produce, with a minimum of inputs in material and labour, a maximum of agricultural output. However, peasants neglected the long-term negative effects of soil erosion, either knowingly or unknowingly, although these effects were clearly visible to them during the rainy seasons. They took measures only to protect their seedlings, but not the soil. Hence, after some 4-5 generations of cultivating family land, the soils would be completely degraded, and a household would have to move its fields to another place, or alternatively, introduce long-term fallow periods to let the soil rest. This worked for centuries because there was sufficient space, in terms of extension and mobility, for everybody to practice agriculture. And there were sufficient land reserves in the highlands still under natural forests that could be cleared. Real long-term ecological sustainability in a defined spatial unit was thus not guaranteed, particularly when space became limited, i.e. at the turn of the 20th Century when the overall population began to grow exponentially. To come back to the Aksumite Kingdom, we are thus not sure whether environmental degradation was so widespread, and population densities in Tigray so high, that the towns could no longer be fed with surplus production due to impoverished soils nearby, or if there were completely different reasons for the end of the kingdom.

In the social dimension, sustainable rural development was ensured in the different cultural systems in the Ethiopian Highlands by different degrees of equity, although basic needs were in principle attained everywhere, unless the whole community was faced with externally-induced problems such as wars, droughts, floods, pests, diseases or other man-made and natural factors. The current rural-urban disparity is especially pronounced in this dimension, because in rural areas there are social networks that are the only means of inter-personal or

inter-family assistance, while in towns the policies and programmes of the state support social equity to some extent, in addition to the social networks.

In the political dimension, rural areas lost their power and influence with the emergence of towns as centres of residence for emperors and kings, and later on as economic centres. The current political decentralisation of Ethiopia into regional states is certainly a major step, but the decision-making power remains in regional, zonal and Wereda (district) capitals, with very little delegated to the community level. In the institutional dimension, rural areas would require much more integration into the state, similar to urban areas.

In the economic dimension, rural Ethiopia suffers from an almost total absence of significant markets. Rural markets are rather places for social gatherings and acquisition of goods to meet certain basic needs in exchange for minimum surplus agricultural products. Transaction costs are becoming rapidly prohibitive given the distance to roads, and agricultural outputs are not diversified enough to stimulate exchange, as every household produces or collects from common access resources what it needs in food, feed, fibre and fuel. But the greatest impediment to economic sustainability is the general lack of purchasing power of rural society. Although virtually all household members starting from the age of five are engaged in agriculture at various levels of intensity, a shift from this occupation to more employment will be required among the rural population.

Given the above five dimensions of sustainability, the role of spatial organisation in rural development should not be underestimated. The high dependence on natural resources in a traditional agricultural system like that in rural Ethiopia calls for optimum use of natural resources in appropriate spatial units. Hence agricultural land must be organised according to the suitability of major land use types, be it for cultivated land (including irrigation land), grazing land, or forest land. This would, however, call for land redistribution, a highly unpopular subject among the rural population, which the government had carried out so far with blueprint regulatory approaches not easily acceptable to the majority of rural people. Equity in such processes is another requirement which cannot be met easily. For example, cultivated land should be situated on slopes not steeper than 15%; otherwise, major investments in terracing are required. But this policy would reduce overall cropland to a fraction of presently cultivated land, meaning that productivity would have to be raised by a factor at least 5. This, nevertheless, would be possible given the technologies available today, but a majority of the rural population would no longer have access to cropland in this scenario. What to do? A portion of the Ethiopian rural population would need to change their occupation from agriculture to other activities; i.e. through secondary and tertiary development.

3 Challenges for developing rural Ethiopia

The first and foremost challenge for developing rural Ethiopia lies in an overall increase in productivity and output in all sectors in rural areas. This concerns the agricultural as well as the secondary and tertiary sectors. An increase in agricultural productivity appears simple, as current yields are astonishingly low compared with results from other developing countries, even in Africa. Fertilizer, improved seeds, better tillage systems, weed control, etc. are the approaches that have been tried over the past 30 years but with only moderate success. The problem apparently does not lie at the farm level, but has to do with the overall structure of the agricultural sector, where 12 million farm households follow similar cropping practices in their subsistence-oriented strategy. On the one hand, any surplus produced by a farmer always competes with similar surplus products produced by like-minded farmers, and as a consequence, prices on the market drop sharply when supply is too high at a given time. On the other hand, in times of production shortage, millions of farmers are affected by the same lack of produce at the same time. The latter is one of the main causes of the vulnerability of the Ethiopian peasantry to famines (cf. Mesfin Wolde-Mariam 1984).

In rural Ethiopia sustainable development can be enhanced if a paradigm shift takes place from the current 'agricultural development-lead industrialisation' (ADLI) to a new 'industrialisation-based agricultural transformation' (IBAT). Agriculture needs to diversify its work-force, from primary sector occupation to secondary and tertiary sector employment. This, however, cannot be initiated through agricultural development, but must become a result of the industrialisation process. Only when there are less people engaged in agriculture and many more in other sectors will farm sizes become larger again and allow the introduction of modern agricultural technologies. Agricultural transformation, in a vision for the year 2050, would result in not more than 30% of the total labour force of the country at that time engaged in agriculture, which will still encompass some 7 million household farms or 35 million people, including children. This vision is based on the assumption that the overall population of Ethiopia will reach a modest 113 million by that time, meaning that the country's active work force will be about 60 million people, of which 20 million will still be active in the agricultural sector, while some 40 million will be employed in the secondary and tertiary sectors. Both figures, although moderate estimates, constitute a challenge for the transformation process. Let us focus on the rural areas.

Rural areas will require fundamental reforms in land use practices, technologies and organisation of labour and rural space. For farming, sustainable use of natural resources, including soil, water and biodiversity conservation, must become the basis of all agricultural activity in rural areas, as more of the current natural potential should not be lost (cf. Pender et al. 2001). Current soil conservation activities have the potential to reduce soil erosion to tolerable limits, but they need to be implemented with care and maintained continuously after their establishment. In some of the research catchments of the Soil Conservation Research Programme (SCRP), it was possible to show that 20 years after establishing a series of soil bunds, and introducing drainage ditches and reforestation, agricultural land could be

developed into field terraces with results that were similar to good experience in many other countries. At the same time, data from harvest yields throughout the catchments and over the years showed that production could be improved, even though some 10-15 % of the cultivated land area had to be transformed into terrace steps.

Figure 5: Development of bench terraces over a 20-year period from soil bunds that were implemented in 1983, leading to sustainable agricultural production even on this steep slope in the Maybar area in Wello province. Photo by Sabina Erny, 2003.

The best example is given in Figures 5 and 6 for Maybar in Wello province, which was conserved in 1983 (cf. Erny and Loetscher 2007). In this SCRP research catchment, the crop yield was improved by 2.2% per year on average, or by an overall 63% in 22 years. Without soil and water conservation, the overall crop yields in Maybar may have been reduced by as much as 18-33 %,, based on the assumption that annual yields would drop by 1-2% due to soil erosion (Hurni 1993). It must be noted that these are average figures. In reality, inter-annual variation is very high, as shown in Figure 6. The drought and famine year of 1984, which was persistent in a large part of the eastern Ethiopian Highlands, is also clearly visible in the graph. From the above figures, one can conclude that without the soil and water conservation measures initiated some 25 years ago and maintained ever since then, the agricultural catchment in Maybar today would have half the grain yield and biomass of what it produces on average now, i.e. only about 150 tonnes of biomass and about 60 tonnes of grains and pulses. For another SCRP research catchment in Anjeni in Gojam province, Kohler (2007) found a similar but statistically less significant result. This catchment was conserved in 1985/6 and has been well maintained since then as well (Figure 7).

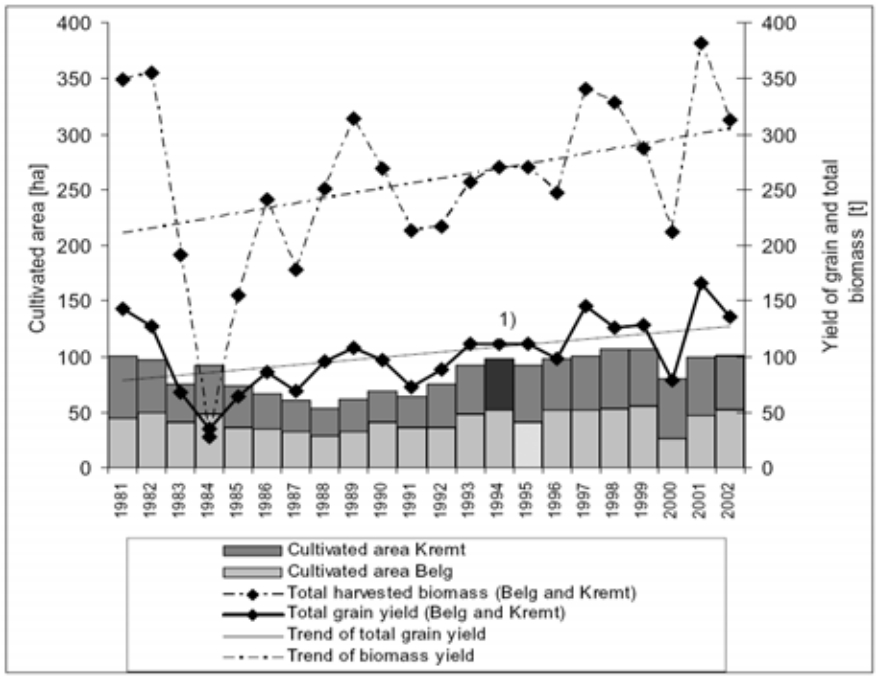

Figure 6: Total yields of grain and biomass (without grain), and cultivated area under crops for the short (Belg) and long (Kremt) rainy season in Maybar, Ethiopia, from 1981 to 2002. The 1 km^2 catchment was conserved in 1983. Source: SCRP and ARARI data analysed by Loetscher 2003. 1) Areas under crops during Kremt 1994 and Belg 1995 were missing, hence average values were taken.

Figure 7: In the research catchment of Anjeni in Gojam province in 1985/6, the introduction of graded soil conservation structures that drain excess surface runoff into small waterways in-between the fields has resulted in an adaptation of traditional drainage ditches with introduced terrace formation structures. Through this, sustainable land management was introduced and has been well maintained until to date. Photo by René Kohler (2004).

In addition to the farming sector, rural areas will need massive investments not just in agriculture, but also in education, health, road access, pre- and post-agricultural industries, food processing, land use planning, forestry, livestock development, and sustainable land management. This needs to be supported by policies addressing rural-urban linkages, land tenure issues (Atakilte 2002), and education and health, but also questions of demographic transition, which can be particularly supportive in accelerating this change. Demographic transition probably reached its peak in terms of growth rate several years ago, but may need to be emphasised until a more or less stable population number is reached in the longer-term future.

A sectoral transition from the dominance of the primary sector to more balanced shares in the secondary and tertiary sectors has the potential to accelerate change in rural areas of the Ethiopian Highlands, although perhaps at the risk of social and public security, for which particular care must be taken. New social identities may be formed during this transition from traditional rural Ethiopia to a modern rural-urban interlinked landscape, to the benefit of both the rural and the increasing urban population.

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